

WEED RISK ASSESSMENT

Sagehen Project

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Introduction: Tahoe National Forest Land Management Plan direction for management of noxious weeds was amended in January 2001 and 2004 by the Sierra Nevada Forest Plan amendment decisions. Forest Land Management Plan and Forest Service Manual 2080 direction call for a risk assessment for noxious weeds to be completed for every project. Specifically, the manual states:

2081.03 - Policy. When any ground disturbing action or activity is proposed, determine the risk of introducing or spreading noxious weeds associated with the proposed action.

1. For projects having moderate to high risk of introducing or spreading noxious weeds, the project decision document must identify noxious weed control measures that must be undertaken during project implementation.
2. Use contract and permit clauses to prevent the introduction or spread of noxious weeds by contractors and permittees. For example, where determined to be appropriate, use clauses requiring contractors or permittees to clean their equipment prior to entering National Forest System lands.

2081.2 - Prevention and Control Measures. Determine the factors, which favor the establishment and spread of noxious weeds and design management practices or prescriptions to reduce the risk of infestation or spread of noxious weeds.

Where funds and other resources do not permit undertaking all desired measures, address and schedule noxious weed prevention and control in the following order:

1. First Priority: Prevent the introduction of new invaders,
2. Second Priority: Conduct early treatment of new infestations, and
3. Third Priority: Contain and control established infestations.

Prevention Emphasis: It is much more cost efficient to prevent an infestation from becoming established than to try to eliminate it once it has begun to spread, or to deal with the effects of a degraded plant community. Prevention includes both reducing the human-assisted spread of seeds and other reproductive parts into a weed-free area, and prompt eradication of the first plants that show up. Hand-pulling the first plant or few plants of a noxious weed that show up in an area is frequently the most efficient and effective mechanism we have for reducing weed spread. A good inventory is important because inventory and initial attack can often occur simultaneously.

Factors in weed risk assessment: There are numerous factors to evaluate when doing a weed risk assessment. They include: inventories, known weed occurrences, habitat vulnerability, non-project dependent vectors, increased vectors as a result of project implementation, mitigation measures and the anticipated weed response to the proposed action(s). Each factor is addressed as to the major components, variations, and the risk for that factor. These factors are addressed in the following table.

NOXIOUS WEED RISK ASSESSMENT TABLE – SAGEHEN PROJECT

Factors	Components	Variations	Risk
1. Inventory	Site specific area, identify, map, estimate numbers/acres	Weed surveys were done in 2004 and 2006. Some observations have been made in 2011 and 2012.	Moderate risk
2. Known noxious weeds	Number of A, B, or C-rated weeds, number of infestations, size	Two occurrences of an “A” rated noxious weed musk thistle were found at the northeast edge of the project boundary outside of any proposed units. These occurrences have been isolated in landings of the Phoenix Project and have been treated repeatedly for 5 seasons. One occurrence of the “B” rated weed tall whitetop has been found outside of the project area, but in rather close proximity to the area. They would also be marked on the TSA map for avoidance. Many occurrence of “C” rated bull thistle, wooly mullein and cheatgrass were found in the landings of previously treated units in adjacent areas.	Moderate risk of spreading “A”. Low risk of spreading “B” rated weeds since they have only been found to occur outside the project area. High risk of spreading “C” rated bull thistle, wooly mullein, and cheatgrass into disturbed sites on skid trails and landings.
3. Habitat vulnerability	Previous disturbance, plant cover, soil cover, shade, soil type, aspect/moisture.	The current vegetation cover is presently high to moderate since some of the project area has been previously thinned (Spring Chicken Fuelbreak) but shrubs are well established. The most commonly occurring “C” rated weeds are dominating the landings from previous harvest activities.	High risk of spreading weeds because the natural vegetation cover has been reduced due to previous management actions and “C” rated weeds are established.
4. Non-project dependent vectors.	Access.	Currently the access roads get low level of traffic along the Sagehen Basin 11 road and moderate traffic to the Sagehen Field Station.	Moderate risk.
5. Habitat alteration expected as a result of project.	Canopy closure and ground cover.	Conifer canopy closure would be reduced where conifer trees are removed and openings such as early seral openings, landings and skid trails create suitable conditions for the spread of invasive species. Underburning and pile burning also increase the area available for invasive species invasion.	High risk of spreading “C” rated invasive species since the project would decrease vegetation cover and could allow weeds to spread from previously used landings on to new landings, skid trails and burn pile rings. Moderate risk for “A” and

Factors	Components	Variations	Risk
			"B" rated weeds to invade openings.
6. Increased vectors as a result of project implementation	Logging equipment has a high potential to bring in noxious weeds.	Logging equipment has a high potential to bring in noxious weeds. Traffic related to project implementation could be moderate. Traffic flow would not be expected to increase over the long-term because new road construction would be limited. The mastication of shrub cover and the creation of new landings and skid trails have potential to open up ground so that weeds could increase in cover.	High risk of "A" and "B" rated species to become established by the transfer of seeds from nearby invasive plant sites or from dirt residue on heavy equipment.
7. Mitigation measures	Prevention (equipment washing, weed-free materials, monitoring), control (prompt action on small infestations), cultural practices (maintain shade, minimize disturbance, design project to reduce weed flow).	Use C-clause for cleaning of heavy equipment. Any equipment that is brought on site should be washed if it is coming from a known noxious weed infested areas. Clean equipment documentation should be performed as equipment arrives to on site or prior to arrival where ever agreed upon by TSA. Any materials for erosion control including gravel or straw bales should be come from a weed free source. Known noxious weed sites in close proximity to project should be marked on Timber Sale Admin map and avoided by traffic moving in and out of project area.	Reduced to risk of spreading "A", "B" and "C" rated noxious weeds to low, especially if post treatment surveys are done and "A" rated musk thistle is treated and any "B" rated noxious weed can be avoided. Reduced risk of spreading "C" rated weeds if equipment is washed before moving on to non-infested areas.
8. Anticipated weed response to proposed action	Tally "high risk" responses in previous factors; consider mitigation if it is adopted as part of the proposed action.	Low risk of introducing weeds "A" and "B" rated weeds as long as the mitigations are followed.	Low risk.

Ecology of the weeds known in or near the project area

The following discussion provides a summary of the ecology and other information for weeds that are known to be near the project area. Refer to the 2003 Tahoe National Forest Noxious Weed Program document for more information.

Musk thistle

Musk thistle (*Carduus nutans*) is an "A" rated invasive plant species. Musk thistle is a native of Eurasia that was introduced to the U.S. in the early 1900s (Whitson et al. 1996). Musk thistle is usually a biennial plant that spends 90% of its life cycle as a rosette, then bolts, flowers, produces seed and dies (Roethe 1979 in Sheley and Petroff 1999). It reproduces from seed. Musk thistle is an out-crossing plant but may self-pollinate. Seed production is variable and dependent on habitat conditions. Seed production per plant can range from a few thousand to more than 100,000 seeds per plant (Sheley and Petroff 1999).

Wind, water, wildlife, livestock and human activities disperse seed. Musk thistle germination is favored on poorly vegetated sites; seedlings usually establish on bare soils (Feldman et al. 1968, Doing et al. 1969 in Sheley and Petroff 1999). Musk thistle seeds may survive a decade or more and may take 15 years to decrease germination of buried musk thistle seeds to 1% (Burnside et al. 1981 in Sheley and Petroff 1999). Musk thistle exhibits allelopathy. Musk thistle seedlings may be sensitive to the competition of neighboring plants for light.

Musk thistle is favored by disturbance (Sheley and Petroff 1999). Re-establishment of desirable vegetation is necessary for successful management of musk thistle. Mechanical, biological and chemical control can be effective. However, the chances of successful control are much higher when several methods are used in combination. Desirable plant competition is also a necessary part of musk thistle control. On the Tahoe National Forest musk thistle has been treated by removing it by hand pulling. Treatments are successful when occurrences are found early. Any proposal to treat noxious weeds with herbicides would have to be analyzed in a separate NEPA document.

Tall Whitetop

Tall whitetop/Perennial pepperweed (*Lepidium latifolium*): Tall whitetop is native to Eurasia where it grows in a wide variety of habitats. It is a State listed B-rated weed. It is now known to grow in all western states. It is an aggressive wetland invader, which increases erosion of stream banks, and excludes native vegetation. It is spread by seeds or segments of rhizomes. Seeds are moved by wind, water, animals, tires, shoes, and contaminated hay, etc. Root fragments can be dispersed by water and soil movement and human activities. Roots can extend into the soil up to 10 feet deep. Manual and/or mechanical methods do not work well because small pieces of the root that remain in the soil can re-sprout and produce new plants. Tall whitetop is known to occur along I-80 and in patches along Highway 89. There is one known occurrence that is close to the project site at the entrance to the summer residence at Bickford's Ranch.

Cheatgrass

Cheatgrass (*Bromus tectorum*): Cheatgrass is a native of Eurasia. First introductions were probably via ballast dumps in about 1850. It was first reported in Nevada in 1906.

Cheatgrass is a non-native annual grass that is found in most of the United States and Canada and in northern Mexico (Sheley and Petroff 1999). It is a very adaptive species with wide ecological amplitude (ibid). It is found in sagebrush semi-desert in the southern Great Basin to coniferous forest of the Rocky Mountains. Cheatgrass can significantly alter native rangeland vegetation composition through competitive exclusion of native species reproduction and the facilitation of wildfires (ibid). Once introduced, it rapidly spreads into adjacent rangeland vegetation.

The sites most susceptible to cheatgrass invasion are those that have deep, loamy soils, south-facing slopes, and 12 to 22 inches (30 to 56 cm) of annual precipitation that peaks in late winter or early spring (Sheley and Petroff 1999). However, high plasticity allows the species to grow under a variety of site conditions. Sheley and Petroff report that cheatgrass is spread by cultivation and

subsequent land abandonment, excessive livestock grazing, and repeated fires. It also grows in areas that have not been cultivated or grazed by livestock. It can spread into un-infested areas by wind and by animals (wild or livestock - in feces, hooves, hair, feathers, and tails). Hay and straw also spread cheatgrass. Humans can transport seeds in vehicles and clothing.

Cheatgrass usually germinates in the early fall and over winters as a small seedling. Plants grow and develop rapidly in the spring and usually flower, develop seeds, and become fully dried within two to three months (ibid). Its fibrous root system is concentrated in the upper 12 inches of the soil. It is a more significant weed of drier environments (ibid). For example, cheatgrass does not generally compete well with perennial grasses in well-managed mountain foothill sites (ibid). It often remains a minor part of later successional moist sites. In drier sites, however, it is very competitive and can rapidly increase whenever perennial plants are stressed by drought, fire, or excessive grazing (ibid).

Cheatgrass can dramatically influence plant community composition by its effects on the fire regime (ibid). For example, prior to European settlement, the fire free intervals probably varied from 20 to 25 years in higher elevation mountain big sagebrush (*Artemisia tridentata vaseyana*), to 50-100 years in drier Wyoming big sagebrush (*Artemisia tridentata wyomingensis*) habitat types that dominated the Snake River Plain. The Snake River Plain now burns at intervals of 5 years or less because cheatgrass has increased the continuity of fine-textured fuels, which promotes frequent and larger fires (ibid).

Cheatgrass is very persistent once it becomes established. Eradication of cheatgrass is not a reasonable goal in most situations (ibid). Burning is an ineffective method for controlling cheatgrass. Although fire greatly reduces the density of cheatgrass plants, the next growing season the plants that establish produce so much more seed per plant, that the post-burn seed production for a site may increase by a factor of 100 (J.A. Young 1998 personal communication).

Bull thistle

Bull thistle (*Cirsium vulgare*): Bull thistle is limited primarily to the worlds north and south temperate zones. Bull thistle's typical habitat is disturbed or degraded land such as roadsides (Sheley and Petroff 1999). Disturbance favors bull thistle because seed production and seedling establishment are enhanced under disturbed conditions. It is normally a biennial plant. It averages 100 seeds per plant. Water, animals and human activities disperse the seed. Wind may also disperse seed, but at a lesser extent. Vegetative cover influences bull thistle population dynamics (ibid). Re-establishment of desired vegetation is usually necessary for successful management of biennial thistles (ibid). Cleaning equipment after operating in a stand of biennial thistle would prevent spread (ibid). Using certified seed and mulch also prevent spread (ibid). Mechanical, physical, and chemical treatments are all effective methods for controlling infestations. Recovery of infested areas should not be considered complete until a diverse population of desirable plants has replaced invasive biennial thistles and they are a minor or non-existent component of the plant community (ibid). It is usually replaced by native vegetation in the long term.

Wooly mullein

Woolly mullein (*Verbascum thapsus*): This biennial plant is native to Asia and is common throughout the temperate parts of North America (Whitson et al 1996). It is difficult to control due to the large number of seeds produced per plant. This plant does occur near the project area. This weed commonly invades burn pile scars. These occurrences and scattered plants are not considered a high risk to ecological health in the project area because of the ecology of the plant. Specifically, it is not a strong competitor with other vegetation. It is usually replaced by native vegetation in the long term.

Ecological summary:

Since two “A” rated invasive plant occurrences of musk thistle were found to occur outside units proposed for treatment under the Sagehen Project Area, there is a moderate likelihood that it could spread from this small center. However, these occurrences have been much reduced in size from a few thousand individuals to less than 100 since they have been treated for the past five years. Known occurrence will be noted on timber sale maps so that they can be avoided to prevent the spreading of this weed. The “B” rated noxious weed occurrences of tall whitetop that was also found in this area will be marked for avoidance as well. The highest concern is that weeds could be brought in by heavy equipment used during logging operations. Mitigations that require clean equipment before it enters National Forest lands will help to minimize the risk for weed introduction to the project area. Other concerns are related to burning piles because sites with bare soil under an open canopy are especially vulnerable to weed invasion. These concerns can be mitigated by requiring that the equipment not be moved in and out of the known infested areas that are in close proximity to the project area. Harvest units would be periodically checked after project implementation for invasive plant invasion. Most “C” rated weeds are already present in many areas that have been previously logged and in adjacent areas. Under these circumstances there is a high risk that widespread “C” rated weeds would increase and concentrate in landing and other highly disturbed areas.

Management Recommendations:

1. Include known locations of weeds on Timber Sale Administration maps so that units with weed sites in close proximity can be avoided and/or possibly contaminated equipment can be washed before leaving the contaminated area. Two occurrences of musk thistle are known in T19N, R16E, Section 32. One is in the NE ¼ of the SW ¼ and the other is in the SW ¼ of the NW ¼. Musk thistle and tall whitetop are known in the NE ¼ of the SW ¼ of Section 29 (T19N, R16E). See Tahoe National Forest GIS Library to find the most recent Invasive Inventory layer.
2. Use C-clause for cleaning of heavy equipment. Any equipment that is brought on site should be washed if it is coming from a known noxious weed infested areas. Clean equipment documentation should be performed before equipment starts working on site.
3. Any materials for erosion control including gravel or straw bales should be weed free certified (Although it is not proposed to bring in any materials at this time). Go to the Cal-IPC website to find sources for weed free materials.

4. Monitor for noxious weed invasion after various stages of implementation, especially after prescribed burning.

Determination:

There is a low risk of spreading the “A” rated invasive plants into the Sagehen Project Area if mitigations are followed to prevent the musk thistle that is known to occur in two old Phoenix landings, to keep invasive plants from spreading. A noxious weed symbol should be placed on the Timber Administration map on the southeastern corner of the project area in the Phoenix landings that have been infested. Another site that should be marked for avoidance is where “A” rated musk thistle and “B” rated tall whitetop has also been found near the entrance to Bickford’s Ranch, so that this site can be avoided and follow up monitoring for musk thistle and tall whitetop would also occur. Mitigations to require clean equipment that is free from dirt and weed seeds should be enforced. “C” rated weeds bull thistle, wooly mullein and cheatgrass are so widespread that they are expected to spread. Usually bull thistle and wooly mullein subside as the native vegetation recovers in the project area. Cheatgrass would most likely be present on drier sites such as south-facing hill slopes and will likely never disappear.

Glossary of botanical terms

“A” rated noxious weed. These weeds are highest priority on the California Department of Food and Agriculture “A” list of noxious weeds. The agency mandates that these species be targeted for eradication or containment.

“B” rated noxious weed. On the California Department of Food and Agriculture “B” list of noxious weeds. These species are more widespread and therefore difficult to contain. The California Department of Food and Agriculture agency allows County Agricultural Commissioners to decide whether to target them for eradication or containment in their jurisdictions.

“C” rated noxious weed. On the California Department of Food and Agriculture “C” list of noxious weeds. These weeds are so widespread the agency does not endorse state or county-funded eradication or containment efforts except in nurseries or seed lots and perhaps new isolated occurrences.

Invasive-exotic weed. A non-native plant that is a plant that is not desired, and is invasive.

Noxious weed. Those plant species designated as noxious weeds by the Secretary of Agriculture or by the responsible state official. Noxious weed generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of serious insects or disease, and being not native or new to or not common to the United States or parts thereof.

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